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Comparison Performance of Conventional Drying Methods and Flat Plate Collector Solar Dryer

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***Abstract:** As another to the marketing of fresh fruits and vegetables, small farmers can think of conservation by drying. In the conservation of agricultural crops, wastewater treatment, and biomass treatment, drying is an important process. Energy requirements for drying can be supplied from different sources, such as fossil fuel, natural gas , electricity, wood, remaining bark forests, and solar energy. Although the use of solar radiation has existed for drying since a long time ago, it has not yet been widely commercialised, particularly in the agricultural sector.*

I. INTRODUCTION

This work is concerned with the comparative study of temperature distribution and performance analysis of flat plate type tunnel dryer and evacuated tubes type tunnel dryer for drying of leafy vegetable. The main thrust of this study is to study the effect various parameters on rate of drying and drying time and percentage reduction in humidity. In short this proposed work will compare the performance analysis of solar dryers for drying of leafy vegetables. The performance of the dryer will be evaluated by measuring the parameters like temperatures at various locations. Other parameters such as outdoor temperature variation, relative humidity, drying rate, drying time, layer thickness of product to dry can be monitored. In fact, solar drying has been used since ancient times for food and agricultural crop preservation. This was achieved particularly by drying open sun under open sky. This approach has many drawbacks, such as product spoilage due to adverse climatic conditions such as rain, humidity, wind and dust, loss of material due to birds and animals, decomposition material failure, growth of insects and fungi. Even the process is highly labour-intensive , time consuming and requires wide area. Thus solar drying is the perfect alternative as a workaround to all the disadvantages to natural drying and unnatural mechanical drying. Solar dryers used for food and crop drying in the agricultural sector.

II. DEVELOPMENT OF EXPERIMENTAL SETUP

From the literature review and considering the suitability of the system for testing solar tunnel dryer system is developed. Figure shows the developed experimental test setup of solar tunnel dryer.

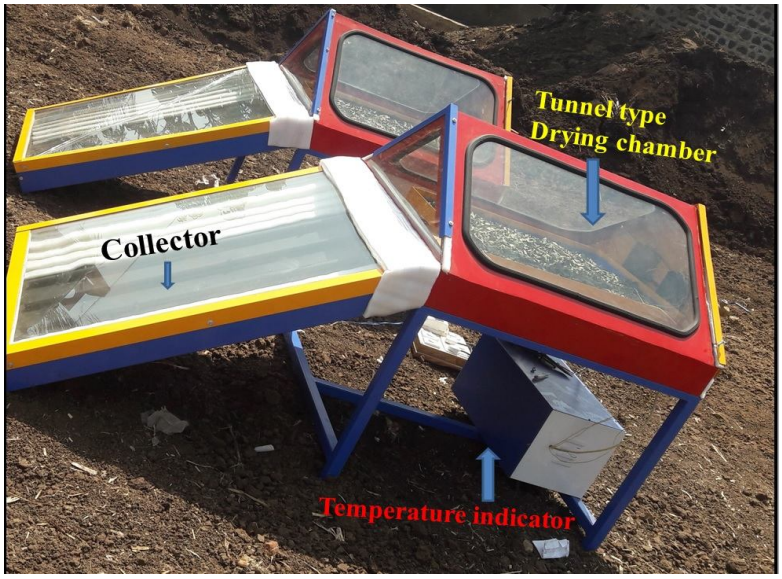

Figure 1. actual experimental setup

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III. EXPERIMENTAL PROCEDURE

The performance of solar dryer is evaluated by obtaining the values of drying rate, system drying efficiency, moisture content. These can be obtained by measuring various parameters like solar radiation, amount of water removal, drying time, relative humidity of air entering in the drying chamber. The experimental procedure consist of following steps

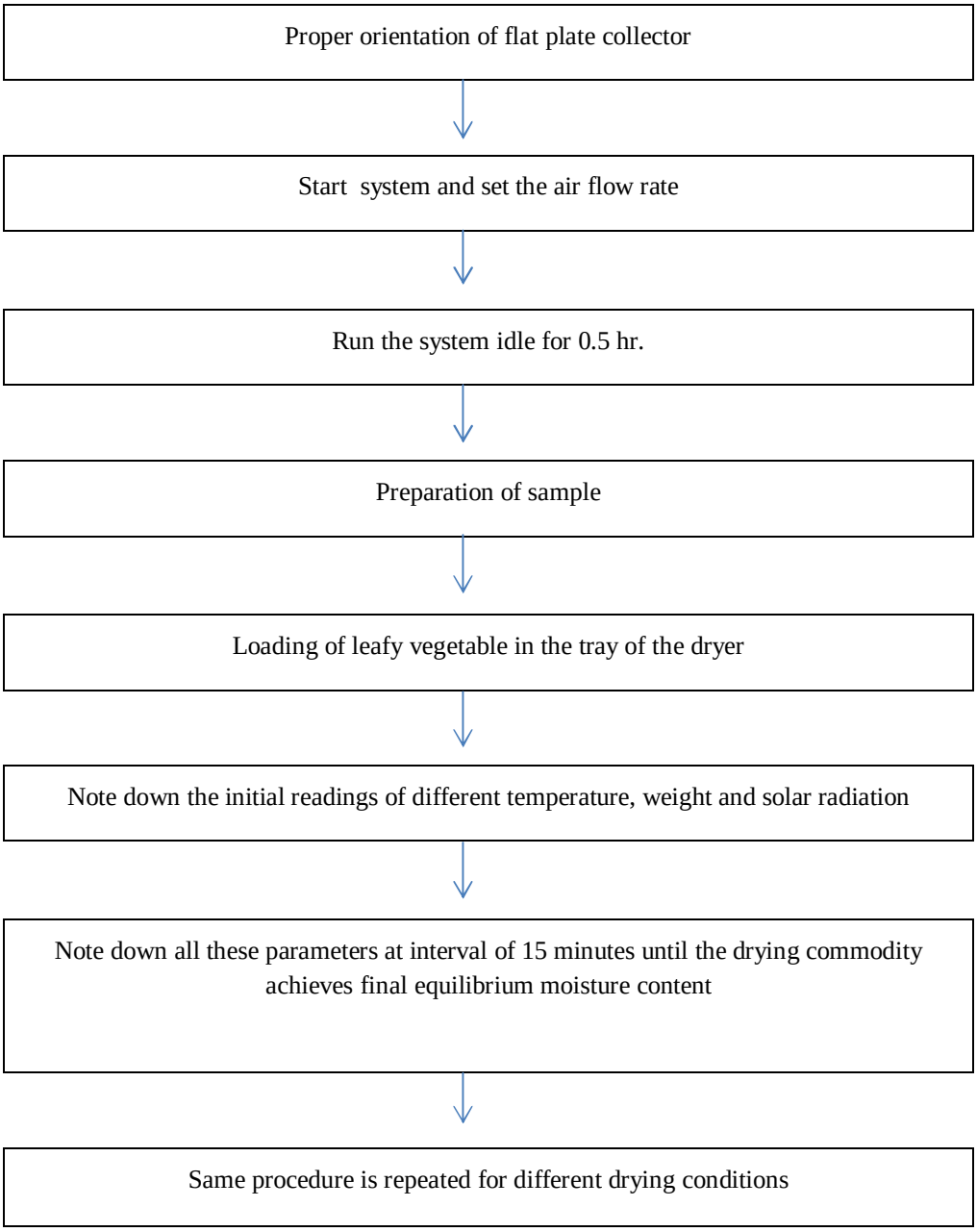

Figure 2.Experimental procedure

IV. CONCLUSIONS

The purpose of the drying of agricultural products by means of a solar tunnel dryer is to improve the drying quality and preserve the products. The solar tunnel dryer has been designed and fabricated for drying leafy vegetables. The effects of different atmospheric conditions on the drying leafy vegetables are carefully observed. For the comparison performance of dryer following points are considered

Table1: Result comparison flat plate type solar tunnel dryer for drying curry leaves

Sr. No.	Particular	Air velocity		
		0.5 m/s	0.6 m/s	0.7 m/s
1	Final moisture content on W.B. (%)	Fogging was Occurred because the air velocity was not sufficient to Throughout the moist air	3.61%	3.75%
2	Total Drying time required		3 hours 45 minutes	4 hours 15 minutes
3	Maximum drying rate		0.004(kg/min)	0.0032(kg/min)
4	Average drying rate		0.0018(kg/min)	0.0015(kg/min)
5	Average System drying efficiency		15.02%	11.75%

Table.2: Result comparison flat plate type solar tunnel dryer for drying coriander

Sr. No.	Particular	Air velocity		
		0.5 m/s	0.6 m/s	0.7 m/s
1	Final moisture content on W.B. (%)	Fogging was Occurred because the air velocity was not sufficient to Throughout the moist air	6.71%	6.71%
2	Total Drying time required		5 hours 30 minutes	5 hours 45 minutes
3	Maximum drying rate		0.0040(kg/min)	0.0038(kg/min)
4	Average drying rate		0.0023(kg/min)	0.0022(kg/min)
5	Average System drying efficiency		16.89%	19.70%

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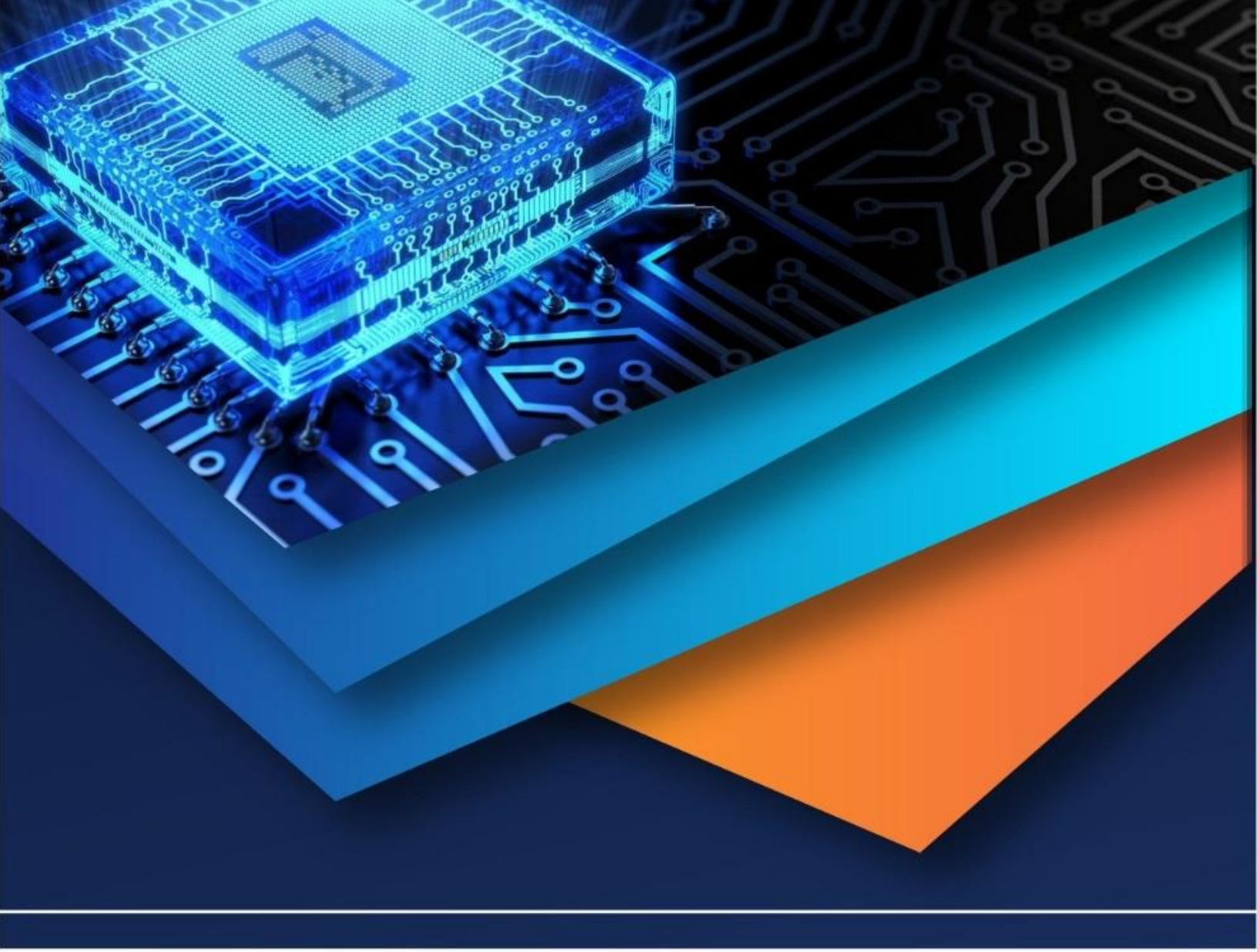

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